WRAC Update

WATER RESOURCES ADVISORY COMMISSION (WRAC)

July 6, 2006

Options for Accelerating Recovery of Phosphorus Impacted Areas in the Florida Everglades

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SFWMD

Everglades Protection Area Tributary Basins
Long-Term Plan for Achieving Water Quality Goals

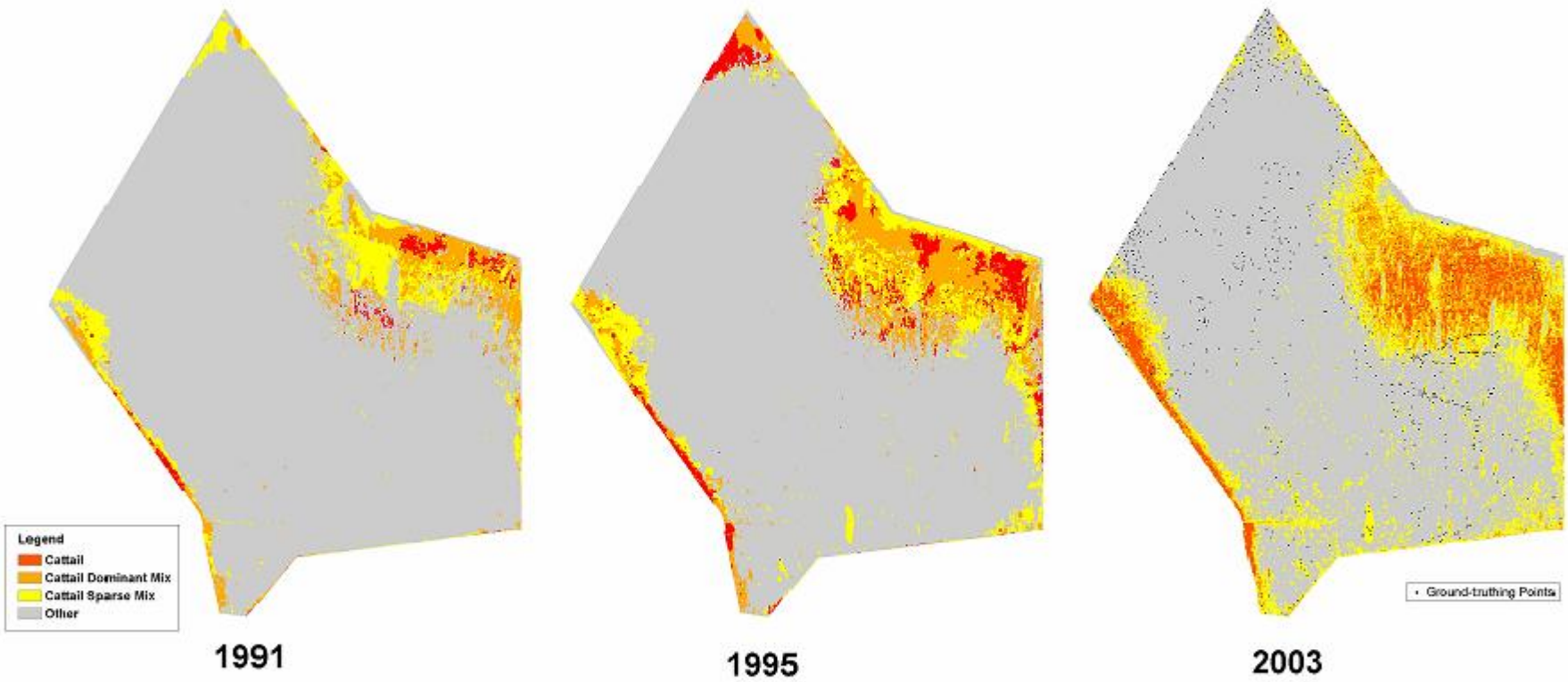
WRAC Update

Options for Accelerating Recovery Project

Problems:

- Phosphorus (P) enriched discharges into the EPA
- Human-mediated changes to hydrologic patterns
- BMP and STAs address the source of P
- However, sediments in the impacted areas of the Everglades are enriched in P
- Monotypic stands of cattail have resulted which are dependent on the high levels of P
- This sediment will continue to be is a source of P for cattail for decades

Water Conservation Area 2A Cattail Trend Analysis 1991 - 2003



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Options for Accelerating Recovery Project

- The probable pace of natural recovery of previously impacted will result in undesirably long recovery period
- Funding for analysis and research on options for accelerating recovery was proposed
- No specific management activities that have been demonstrated to accelerate recovery at a large scale
- Some concerns that active management in impacted areas may exacerbate phosphorus movement
- Evidence from short-term studies that options may exist for accelerating recovery
- The use of prescribed burns in previously impacted areas was suggested

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Options for Accelerating Recovery Project

- Other options included the application of herbicides and/or harvesting in previously impacted areas
- The Department of the Interior expressed an interest in conducting research on the efficacy of prescribed burns on habitat restoration in the Loxahatchee National Wildlife Refuge
- It was anticipated that research would require expenditures (FY 2003 dollars) of $500,000 per year for a 3-year period encompassing Fiscal Years 2004-2006, inclusive
- Subsequent to development of the Long-Term Plan, revised proposed schedule and cost estimates were developed for this project
  - Proposed revision is separate item on today's agenda

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Approach:

- Conduct research to answer questions related to accelerating the recovery of cattail impacted areas
- SFWMD scientists developed research projects to address the issue:
  - Fire Project
  - Cattail Habitat Improvement Project (CHIP)
- These projects were presented at an “Options for Accelerating Recovery” Scientific and Public Workshop
- The projects were then reviewed by an external panel of expert scientists

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Two studies were proposed that address different aspects of recovery:

- FIRE: To assess whether repeated fire can be used as an effective management tool to manage cattail expansion by examining vegetation and biogeochemical cycling (Long-Term Plan project)
- CHIP: To assess the effect of created openings in cattail stands on ecosystem function by examining food web dynamics using a stoichiometric approach (related to but separate from Long-Term Plan)

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Ecological effects of fire and natural recovery in a phosphorus enriched Everglades wetland (Fire Project)

ShiLi Miao

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Fire Project Objectives:

- To assess whether repeated fire can be used as an effective management tool to manage cattail expansion

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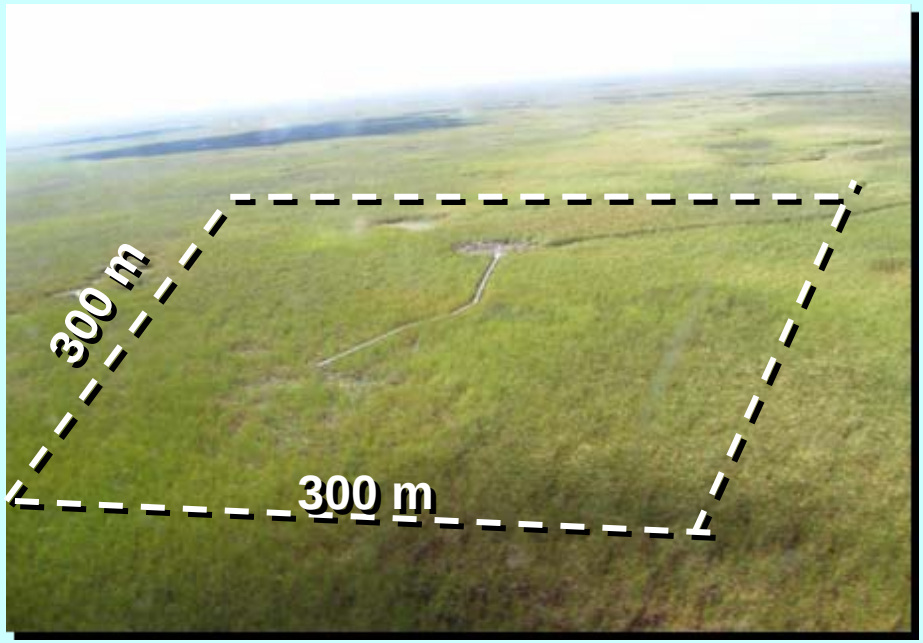
Fire Project design:

- Six 300 m X 300 m plots within WCA2A



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Fire Project Status:

- Completed Tasks
  - Site selection
  - Walkway construction
  - Coordination with outside labs and agencies
  - Methods testing for sampling procedures

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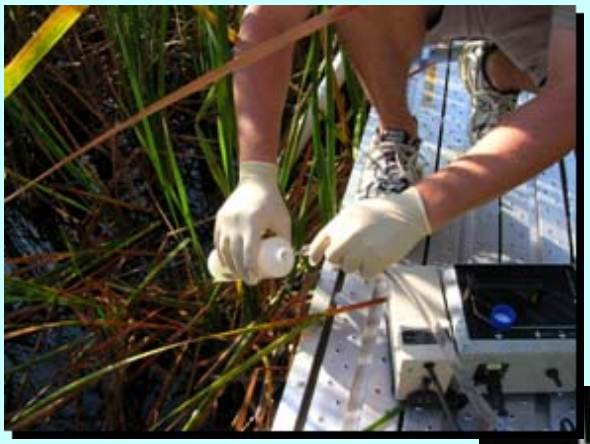
Fire Project Studies Initiated:



Water quality

Biomass harvest

Seed bank

Soil study

Plant growth

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Fire Project upcoming events in 2006:

- Continued pre-burn sampling and studies
- First burn implementation
- Post-burn sampling
- Initiation of decomposition study
- Initiation of native vegetation recruitment study
- Public outreach

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Fire Project: To enable the implementation of multiple burns and additional data collection we propose:

- An extended research schedule through FY10
- Additional funding required to complete the project
- A report to the Legislature on risks and benefits in FY08
- A supplemental workshop (with design engineers) and report with management recommendations in FY10

Proposed Revisions to Long-Term Plan

Options for Accelerating Recovery Project

- In anticipation that the probable pace of natural recovery of previously impacted areas would result in an undesirably long recovery period, the funding of analysis and research on options for accelerating recovery was proposed
- At that time there were no specific management activities that had been demonstrated to accelerated recovery from dense cattail to sawgrass dominated wetlands at a large scale
- It was anticipated that research would require expenditures (FY 2003 dollars) of $500,000 per year for a 3-year period encompassing Fiscal Years 2004-2006, inclusive

Proposed Revisions to Long-Term Plan

Options for Accelerating Recovery Project (cont.)

- The Fire project will utilize repeated controlled burns at highly and moderately enriched sites (in Water Conservation Area-2A) to test the hypothesis that these treatments will accelerate the recovery of ecological function in these areas, as the nutrient loading from the Everglades Agricultural Area is reduced.
- It is proposed that the Options for Accelerating Recovery Fire project be extended by four years to FY2010 with a revised total budget of $3,767,282.

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Options for Accelerating Recovery Summary	FY04	FY05	FY06	FY07	FY08	FY09	FY10	Total
Original Plan	$500,000.00	$500,000.00	$500,000.00					$1,500,000.00
Actual Costs (as of 31Jan06)	$170,152.00	$498,757.00	$352,443.00					$1,021,352.00
Proposed Change (01Feb06 to FY10)			$470,019.00	$834,705.00	$698,548.00	$645,158.00	$97,500.00	$2,745,930.00
						Total Proposed Change		$3,767,282.00
						Total Increase		$2,267,282.00

Proposed Revisions to Long-Term Plan

WATER RESOURCES ADVISORY COMMISSION (WRAC)

July 6, 2006

Proposed Revisions to Long-Term Plan

Tracey Piccone, P.E.

Proposed Revisions to Long-Term Plan

- STA-1W Enhancements Project
- STA-2 Enhancements Project
- Hydrologic and Hydraulic Assessment Project
- Internal Measurements Project
- Comparative Analysis Project
- STA-6 Sections 1 and 2 Enhancements Project

Proposed Revisions to Plan

STA-1W Northern Flow-way (Cell 5) Enhancements

- As a direct result of the September 2004 hurricanes, the SAV in the eastern portion of Cell 5B was uprooted and a severe decline of the vegetation in the western portion of the cell was set in motion, ultimately resulting in virtually a complete loss of SAV in Cell 5B

Proposed Revisions to Plan

STA-1W Northern Flow-way (Cell 5) Enhancements (cont.)

- Deterioration of SAV was likely due to combination of the following factors:
  - Unconsolidated sediment was easily suspended resulting in:
    - excessive turbidity, and
    - the inability to adequately secure vegetative roots
  - Non-uniform depths, with north-eastern portions of the system much deeper than others, resulting in water depths higher than optimal for SAV growth in these areas
  - Due to the dark tannic water, the deeper areas resulted in poor light penetration and played a part in the poor SAV growth
  - Severe hurricane winds in September 2004 and October 2005 resulting in uprooted vegetation and re-suspension of sediment into the water column

Proposed Revisions to Plan

STA-1W Northern Flow-way (Cell 5) Enhancements (cont.)

- After the 2004 hurricanes, steps were taken to improve Cell 5 vegetation growth
  - Water depths were lowered
  - Loads were reduced

Proposed Revisions to Plan

STA-1W Northern Flow-way (Cell 5) Enhancements (cont.)

- After the 2005 hurricane, sediment and vegetation were severely disrupted and additional action was proposed:
  - Extensive dry-out of Cell 5B to consolidate the sediment
  - Planting of rice to assist with
    - Sediment stabilization
    - Anchoring of SAV
    - Attachment area for epiphytic periphyton
  - Planting of vegetated berms in Cell 5B to serve as windbreaks
  - Re-distribution of cell material from high areas to low areas

Proposed Revisions to Plan

STA-1W Eastern Flow-way (Cells 1 & 3) Enhancements

- Construction of G-248 levee scheduled for winter 2006 (FY07) (previously approved revision)
  - Will divide Cell 1, resulting in Cells 1A and 1B
- Construction to be completed in the wet
  - Inflow to eastern flow-way may be reduced, not halted
  - Estimated completion by July 2007 (FY07)
- If needed, G-253 culvert maintenance will be included
  - O&M activity

Proposed Revisions to Plan

STA-1W, Eastern Flow-way (Cells 1 & 3) Enhancements (cont.)

- Vegetation conversion to SAV in Cells 1B and 3
  - Based on lessons learned with STA-1W Cell 4 conversion, District will avoid taking the cell completely off-line for vegetation conversion
  - May occur concurrently with construction beginning February or March 2007 (FY07)
  - Selective spraying of herbicide will be employed to open areas for SAV growth and encourage vegetated berms as wind breaks
  - Estimated completion by January 2008, with grow-in over the summer of 2008

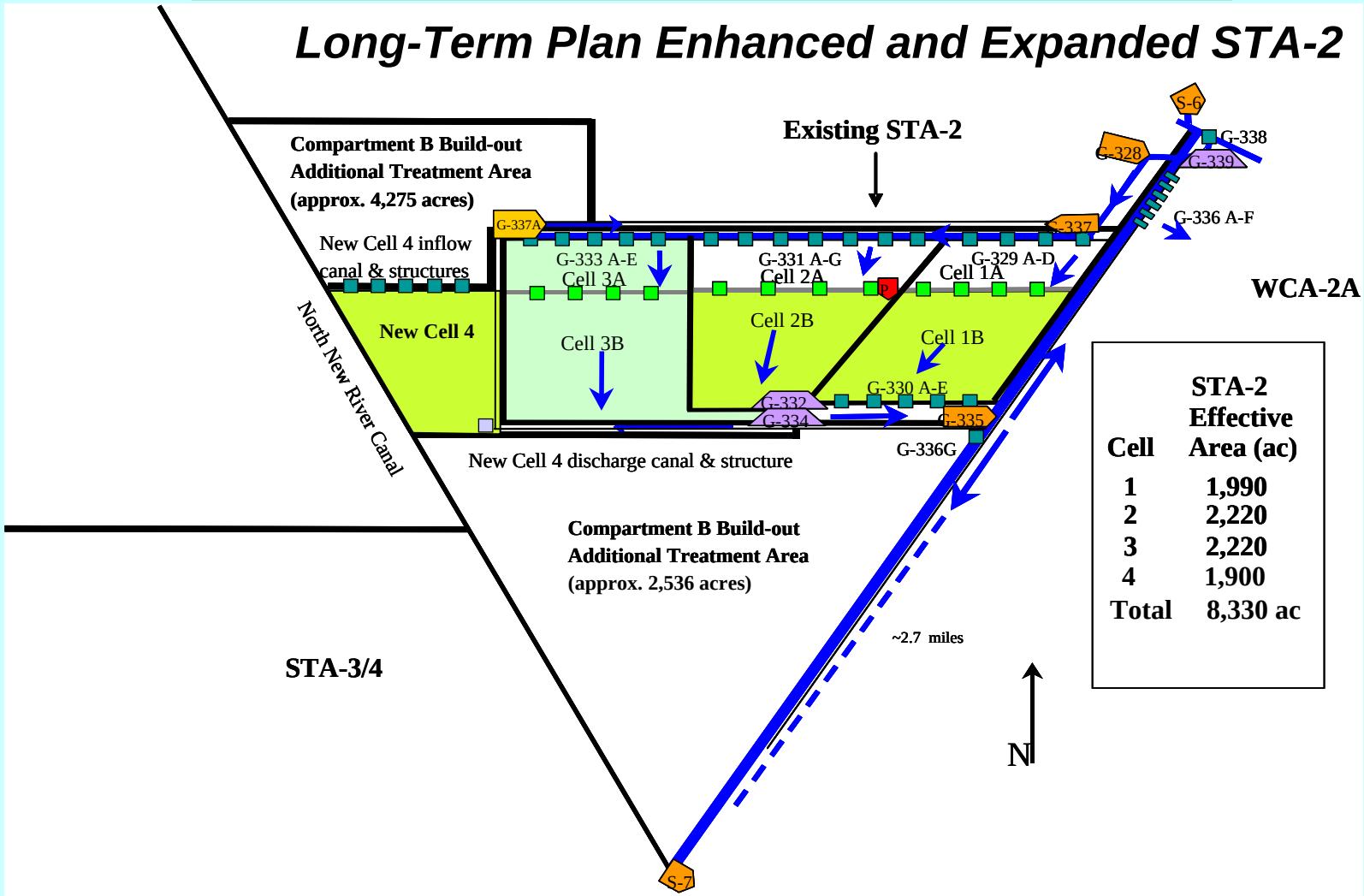
Proposed Revisions to Plan

STA-2 Enhancements Project

Hydrologic and Hydraulic Assessment Project
Internal Measurements Project

Comparative Analysis Project

Proposed Revisions to Plan



Everglades Protection Area Tributary Basins
Long-Term Plan for Achieving Water Quality Goals

Proposed Revisions to Plan

STA-2 Cell 3 Enhancements

- Long-Term Plan assumed improvement in TP removal resulting from improved flow distribution from new levee and structures
  - Cell 3 capital cost for levees/structures: $2.37 million (FY2003 $)
  - Would require Cell 3 to be taken off-line for 12-30 months
- Tracer study demonstrated efficient hydraulics in STA-2 Cell 3 without the levee (DB Environmental, Inc. 2004)
  - 5.5 tanks in series
- Evaluated performance with & without Cell 3 compartmentalization
  - DMSTA2 model runs indicate no improved TP removal performance with levee compared to without levee

Proposed Revisions to Plan

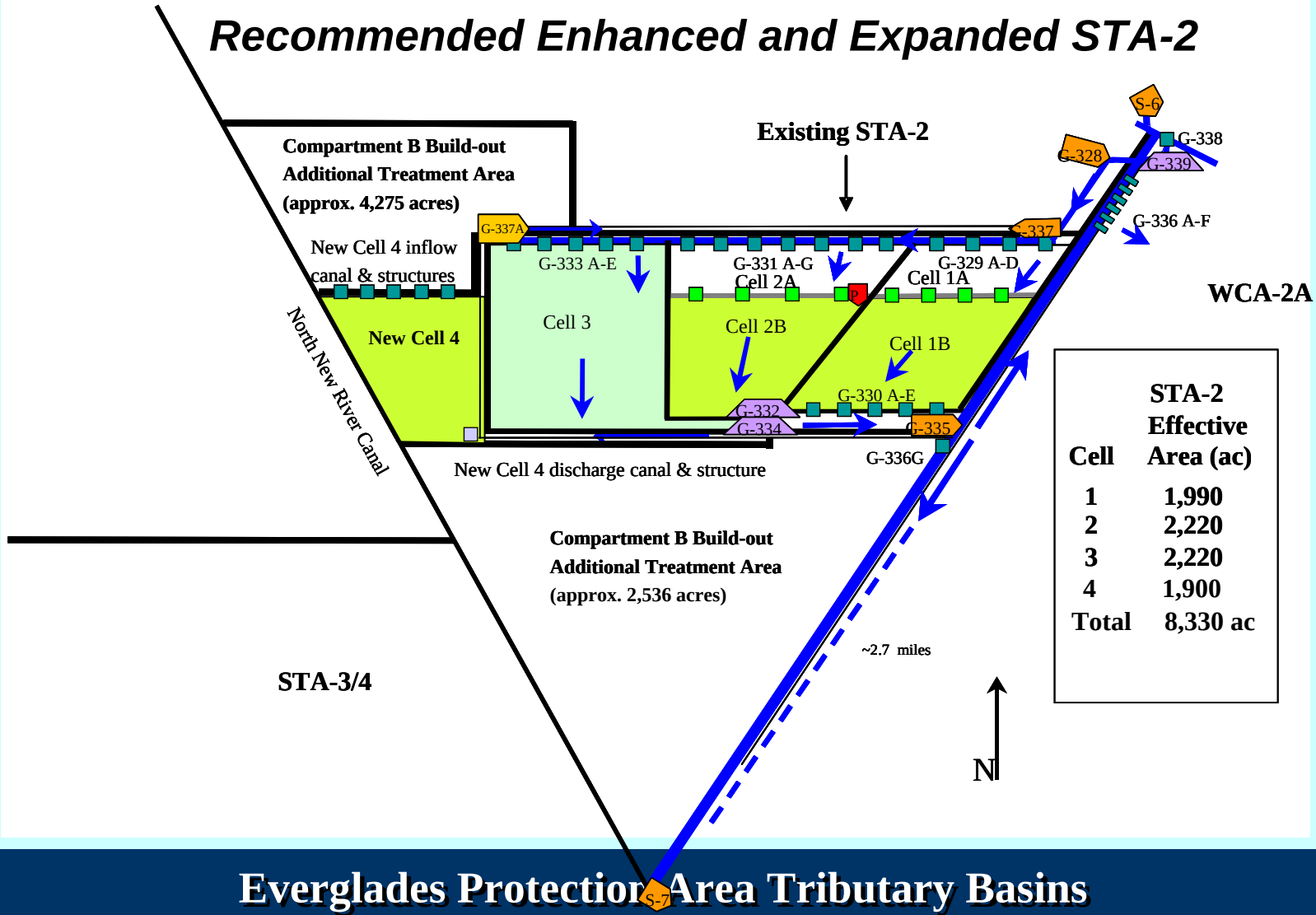
Comparison of TP Removal Performance

- 2003 Long-Term Plan (WY2007-2014)
  - STA-2 Discharge: 222,655 AF/yr 4,568-6,420 kg/yr 17-28 ppb
  - Cells 3A/3B: 77,782 AF/yr 1,387 kg/yr 14 ppb

- 2005 EAA Regional Feasibility Study Data
  - Enhancements deferred; not simulated in RFS
  - For comparison, used WY2006-2009 Data set & DMSTA2
  - With compartments:
    - STA-2 Discharge: 346,275 AF/yr 10,159 kg/yr 24 ppb
    - Cells 3A/3B: 169,267 AF/yr 6,150 kg/yr 30 ppb
  - Without Cell 3 compartment (5.5 tanks in series):
    - STA-2 Discharge: 346,275 AF/yr 10,159 kg/yr 24 ppb
    - Cell 3: 169,267 AF/yr 6,120 kg/yr 30 ppb

Proposed Revisions to Plan

Recommended Enhanced and Expanded STA-2



Cell	STA-2 Effective Area (ac)
1	1,990
2	2,220
3	2,220
4	1,900
Total	8,330 ac

Everglades Protection Area Tributary Basins
Long-Term Plan for Achieving Water Quality Goals

Proposed Revisions to Plan

Hydrologic and Hydraulic Assessment & Internal Measurements

- Pre-levee tracer performed in STA-2 Cell 3 per original Long-Term Plan recommendation
- As a result of proposal to delete proposed STA-2 Cell 3 internal levee
  - Location of the tracer and synoptic internal measurements is proposed to be moved to STA-1W eastern flow-way (Cells 1A, 1B, and 3) where a pre-levee tracer was performed
    - Estimated tracer start date of Fall 2008 (FY09)
    - Estimated tracer completion by December 2008 (FY09)

Proposed Revisions to Plan

Comparative Analysis

- Move comparative analysis report from FY08 to FY09 to reflect results of STA-1W eastern flow-way tracer (with levee)
- Use results to determine whether or not to proceed with the STA-2 Cells 1 and 2 internal levees

Proposed Revisions to Plan

STA-2 Enhancements (Cells 1 and 2)

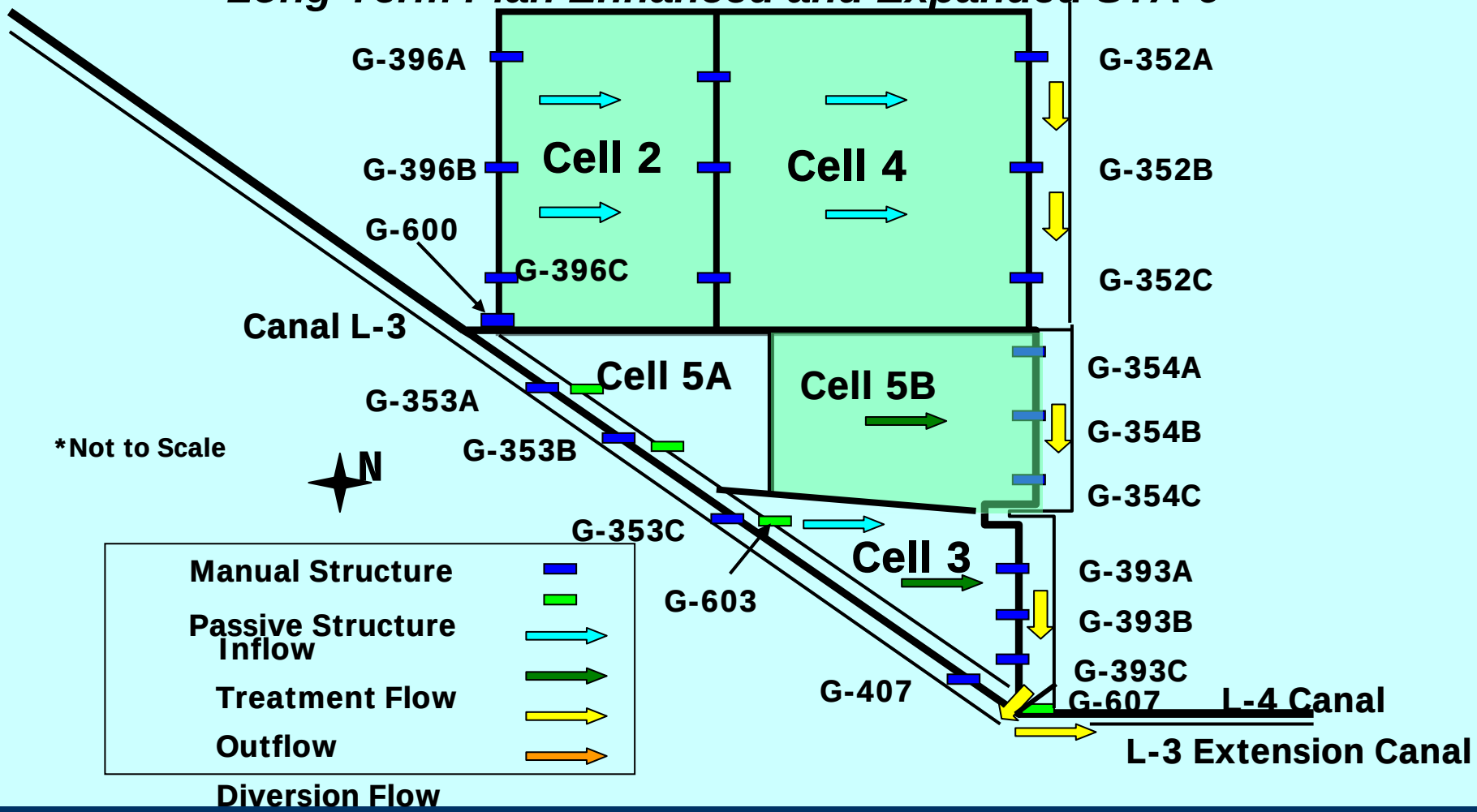
- If the with-levee tracer project confirms improved performance, proceed with the STA-2 Cells 1 and 2 internal levees
- Construction would occur within the current approved schedule for this work as follows:
  - Cell 2 levee: Start construction Dec. 2008 – Dec. 2010
  - Cell 1 levee: Start construction Dec. 2009 – Dec. 2011

Proposed Revisions to Plan

Proposed Revisions to STA-6 Sections 1 & 2 Enhancements

Proposed Revisions to Plan

Long-Term Plan Enhanced and Expanded STA-6



Everglades Protection Area Tributary Basins
Long-Term Plan for Achieving Water Quality Goals

Proposed Revisions to Plan

STA-6 Sections 1 and 2 Enhancements

- Long-Term Plan assumed improvement in TP removal resulting from improved flow distribution from new levee and structures & SAV in Cell 5B
  - Cell 5 capital cost for enhancements: $2.92 million (FY2003 $)
  - Section 2 capital cost for levees/structures: $2.94 million (FY2003 $)
  - Would require Cell 5 to be taken off-line for 12-30 months
- URS evaluated performance without compartmentalization as part of STA-6 Section 2 Basis of Design Report (BODR)

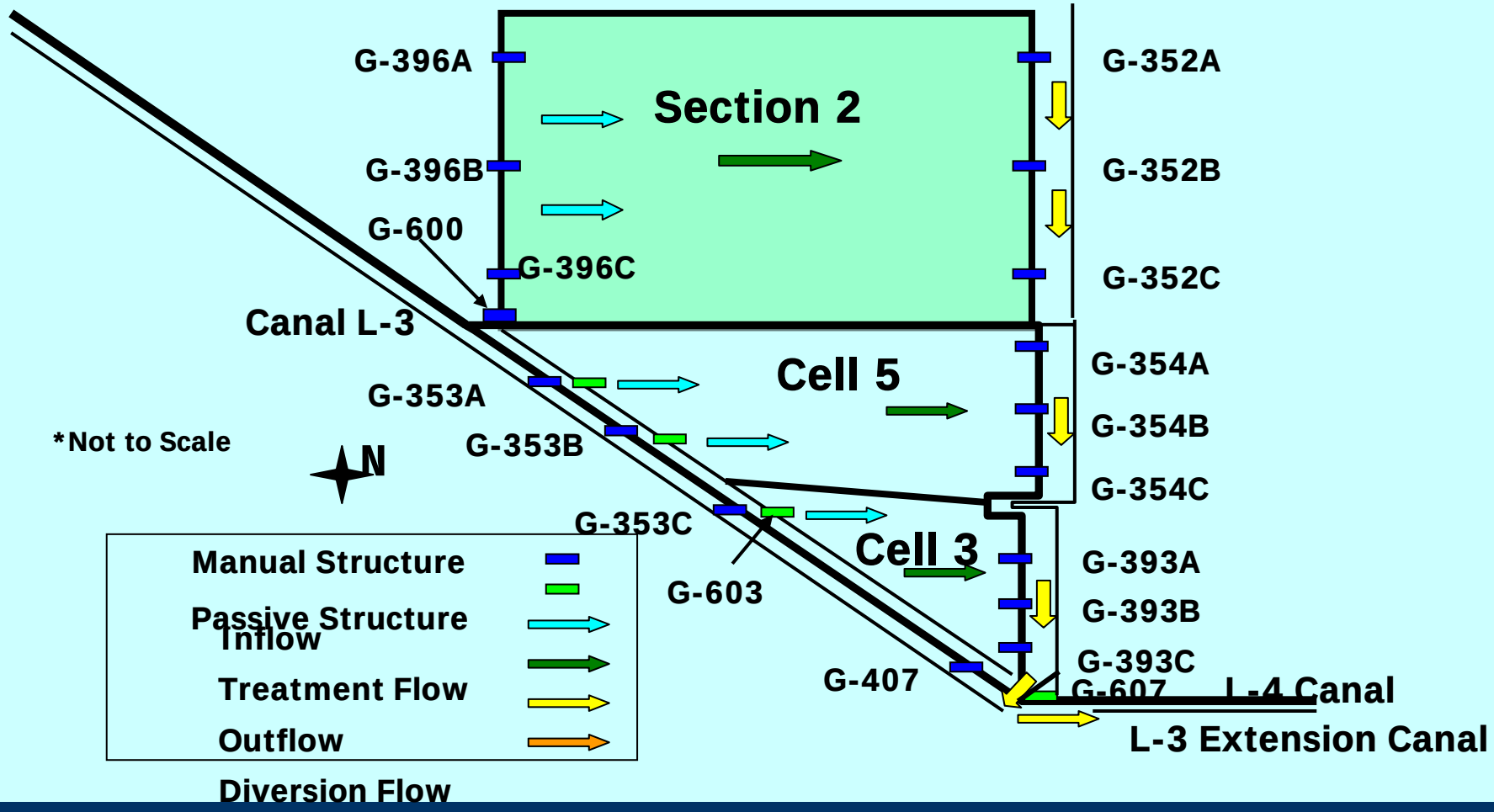
Proposed Revisions to Plan

Comparison of TP Removal Performance

- 2003 Long-Term Plan (WY2007-2014)
  - Discharge: 35,100 AF/yr 750-1,040 kg/yr 17-24 ppb
- 2005 STA-6 Expansion BODR (URS 2005)
  - Discharge: 44,000 AF/yr 760-908 kg/yr 14-17 ppb
  - Basis of Design Report Stormwater Treatment Area 6 Section 2. June 2005 (Updated January 2006, page 5-9)

Proposed Revisions to Plan

Recommended Enhanced and Expanded STA-6



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Proposed Revisions to Plan

- Elimination of enhancements to STA-2 Cell 3 and STA-6 Sections 1 and 2:
  - Potential capital cost savings of $8.23 million (FY2003 $)
  - No impact to TP removal performance based on DMSTA2 evaluations
    - STA-2 Cell 3: Goforth
    - STA-6: URS